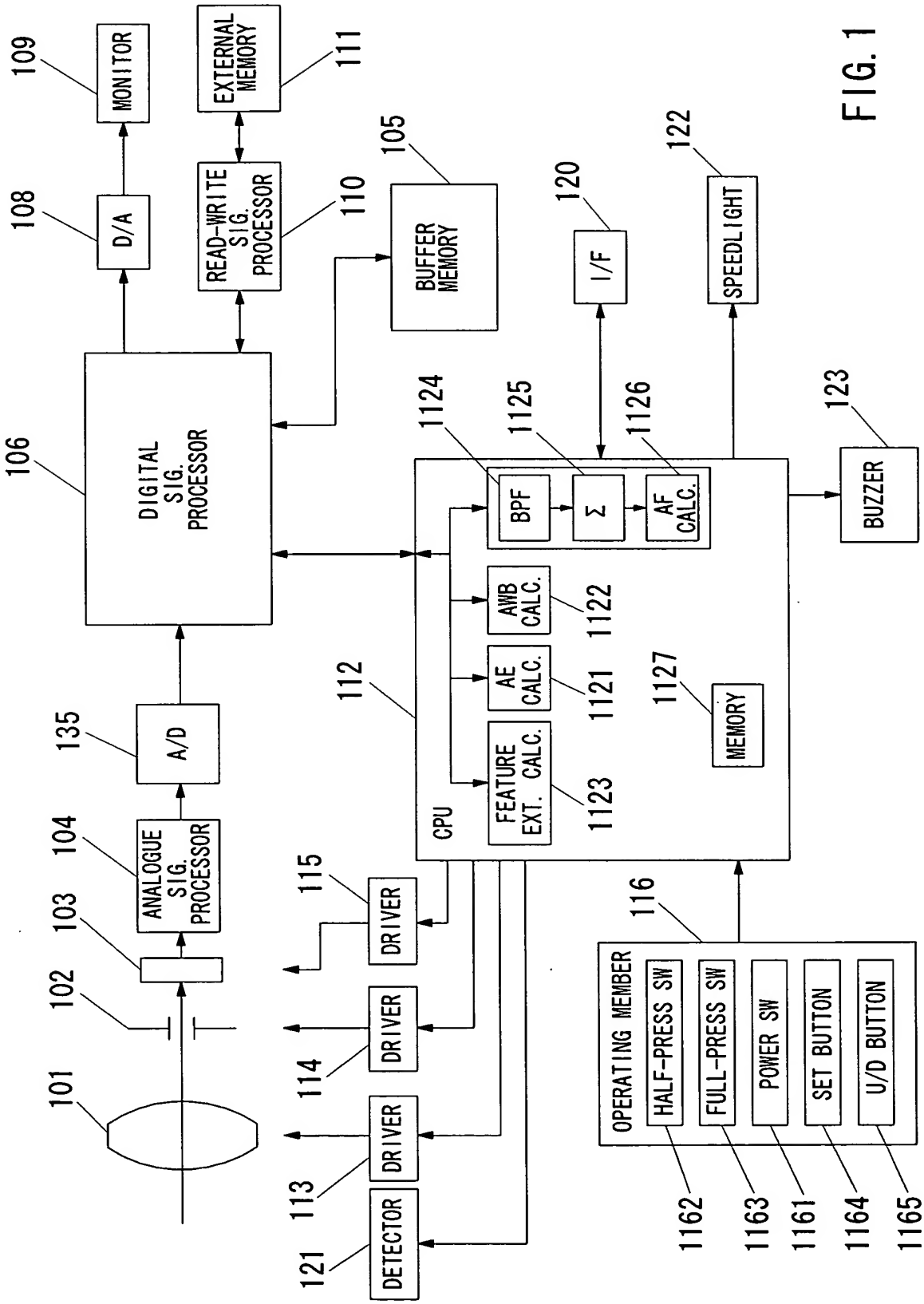
MONITOR
109
EXTERNAL MEMORY
111
D/A
108
READ-WRITE SIG. PROCESSOR
110
105
BUFFER MEMORY
120
I/F
122
SPEEDLIGHT
DIGITAL SIG. PROCESSOR
106
1124
1125
1126
123
BUZZER
BPF
Σ
AF CALC.
AWB CALC.
1122
AE CALC.
1121
1127
MEMORY
112
CPU
FEATURE EXT. CALC.
1123
A/D
135
ANALOGUE SIG. PROCESSOR
104
103
102
101
115
DRIVER
114
DRIVER
113
DRIVER
121
DETECTOR
116
OPERATING MEMBER
HALF-PRESS SW
FULL-PRESS SW
POWER SW
SET BUTTON
U/D BUTTON
1162
1163
1161
1164
1165

FIG. 1

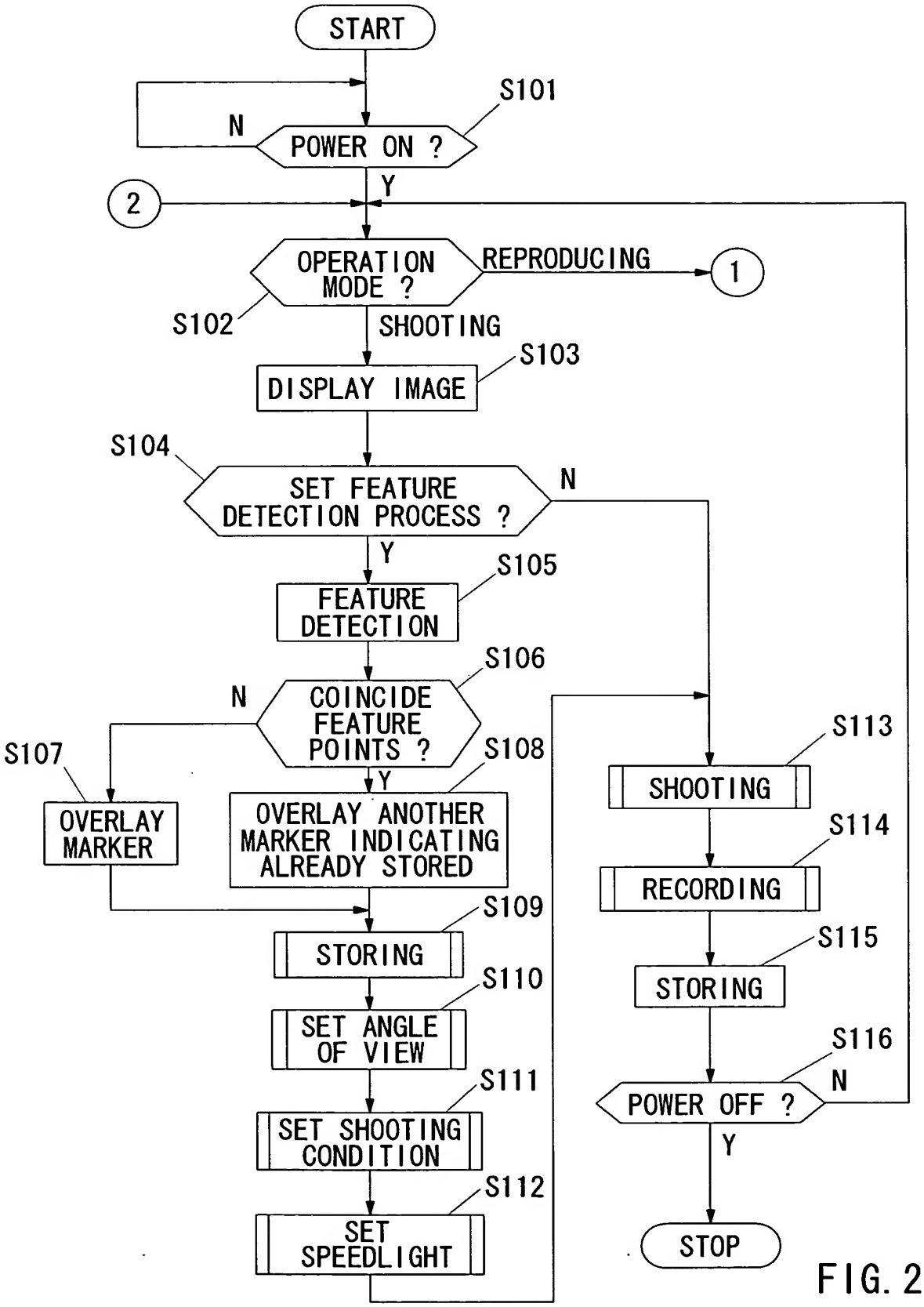
START
S101
N
POWER ON ?
Y
2
OPERATION MODE ?
REPRODUCING
1
S102
SHOOTING
S103
DISPLAY IMAGE
S104
SET FEATURE DETECTION PROCESS ?
N
Y
S105
FEATURE DETECTION
S106
N
COINCIDE FEATURE POINTS ?
S107
S108
Y
OVERLAY MARKER
OVERLAY ANOTHER MARKER INDICATING ALREADY STORED
S109
STORING
S110
SET ANGLE OF VIEW
S111
SET SHOOTING CONDITION
S112
SET SPEEDLIGHT
S113
SHOOTING
S114
RECORDING
S115
STORING
S116
POWER OFF ?
N
Y
STOP

FIG. 2

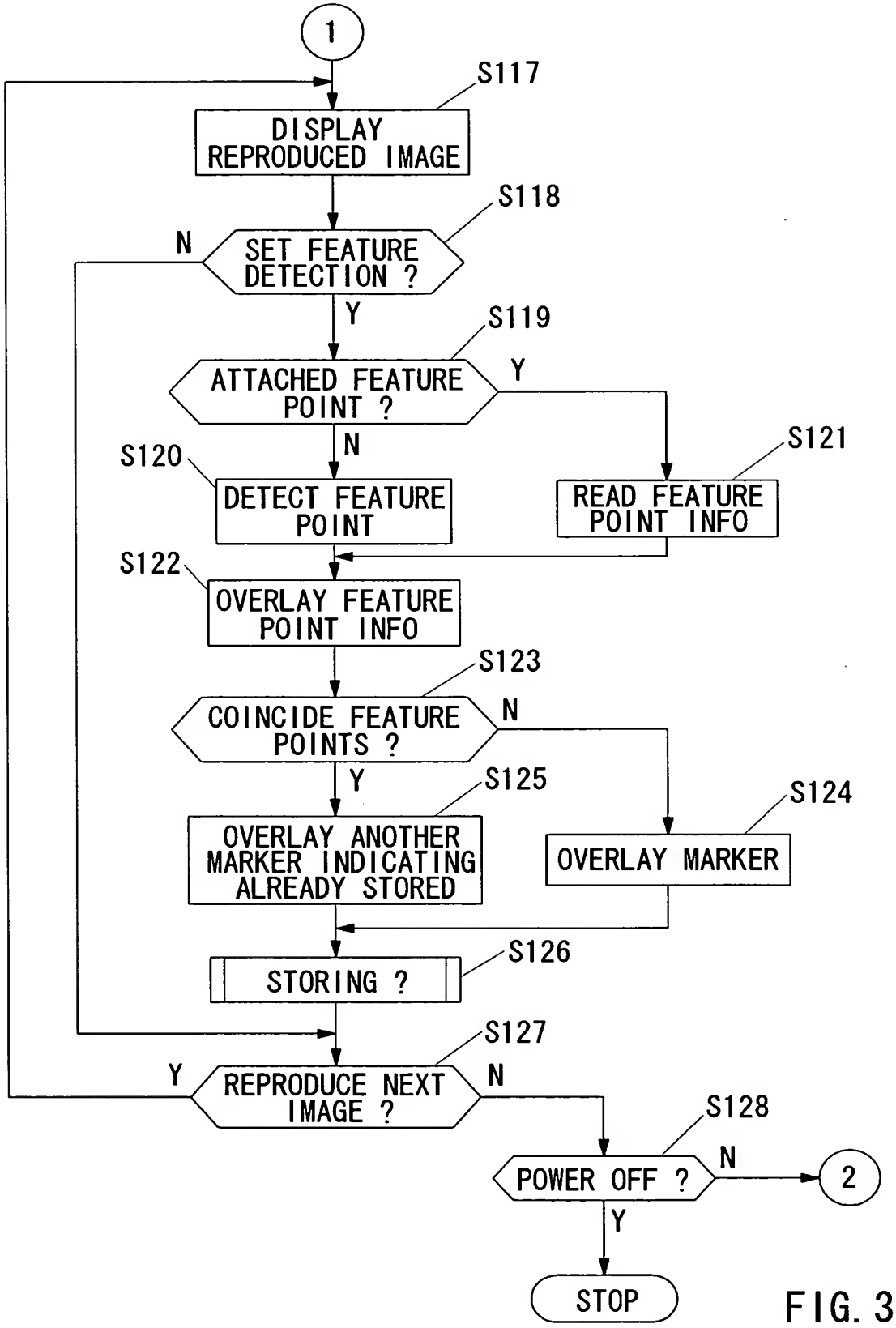
1
S117
DISPLAY REPRODUCED IMAGE
S118
SET FEATURE DETECTION ?
N
Y
S119
ATTACHED FEATURE POINT ?
Y
N
S120
DETECT FEATURE POINT
S121
READ FEATURE POINT INFO
S122
OVERLAY FEATURE POINT INFO
S123
COINCIDE FEATURE POINTS ?
N
Y
S125
OVERLAY ANOTHER MARKER INDICATING ALREADY STORED
S124
OVERLAY MARKER
S126
STORING ?
S127
Y
REPRODUCE NEXT IMAGE ?
N
S128
POWER OFF ?
N
2
Y
STOP

FIG. 3

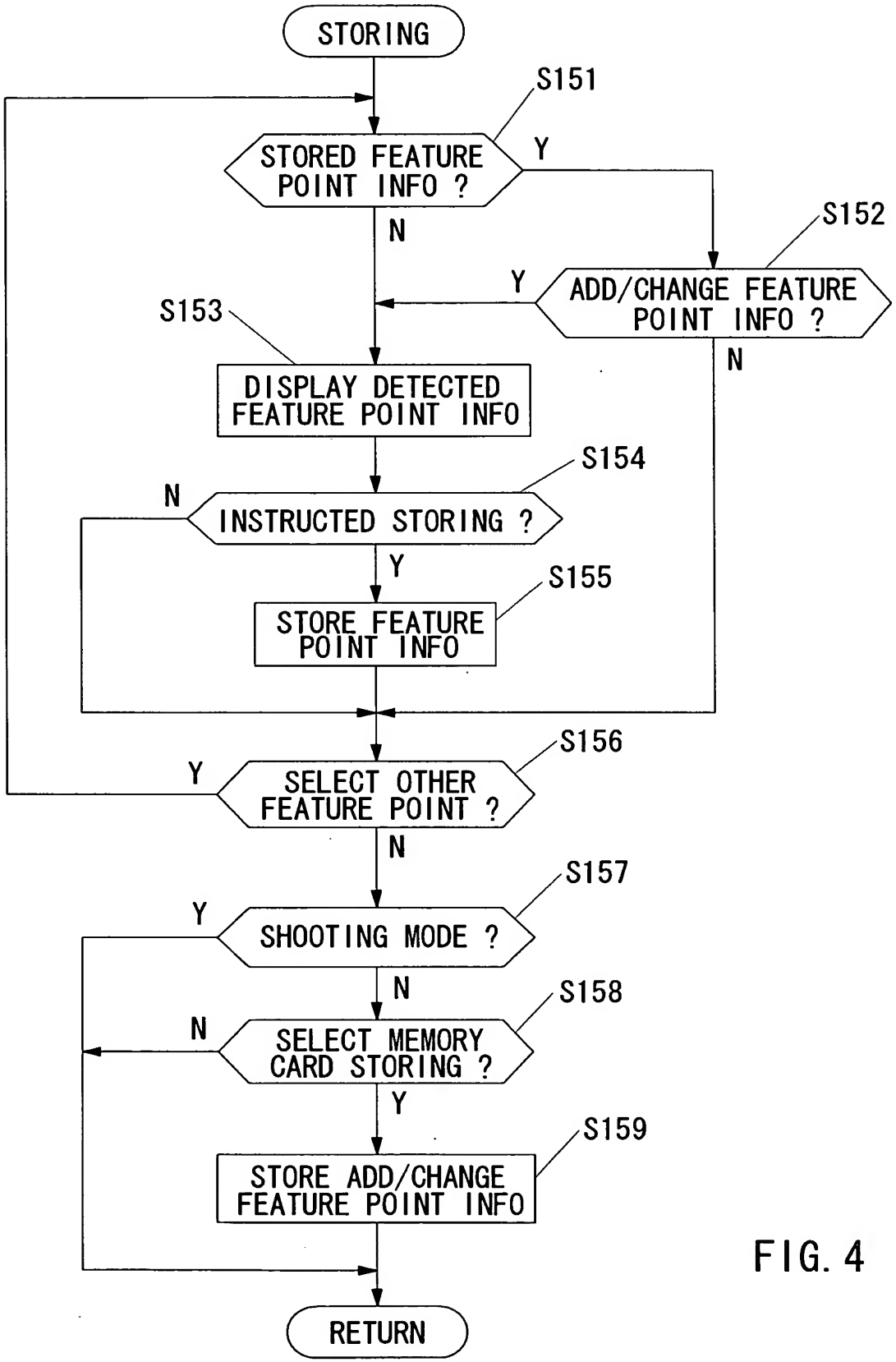
STORING
S151
STORED FEATURE POINT INFO ?
Y
N
S152
ADD/CHANGE FEATURE POINT INFO ?
Y
N
S153
DISPLAY DETECTED FEATURE POINT INFO
S154
INSTRUCTED STORING ?
N
Y
S155
STORE FEATURE POINT INFO
S156
SELECT OTHER FEATURE POINT ?
Y
N
S157
SHOOTING MODE ?
Y
N
S158
SELECT MEMORY CARD STORING ?
N
Y
S159
STORE ADD/CHANGE FEATURE POINT INFO
RETURN

FIG. 4

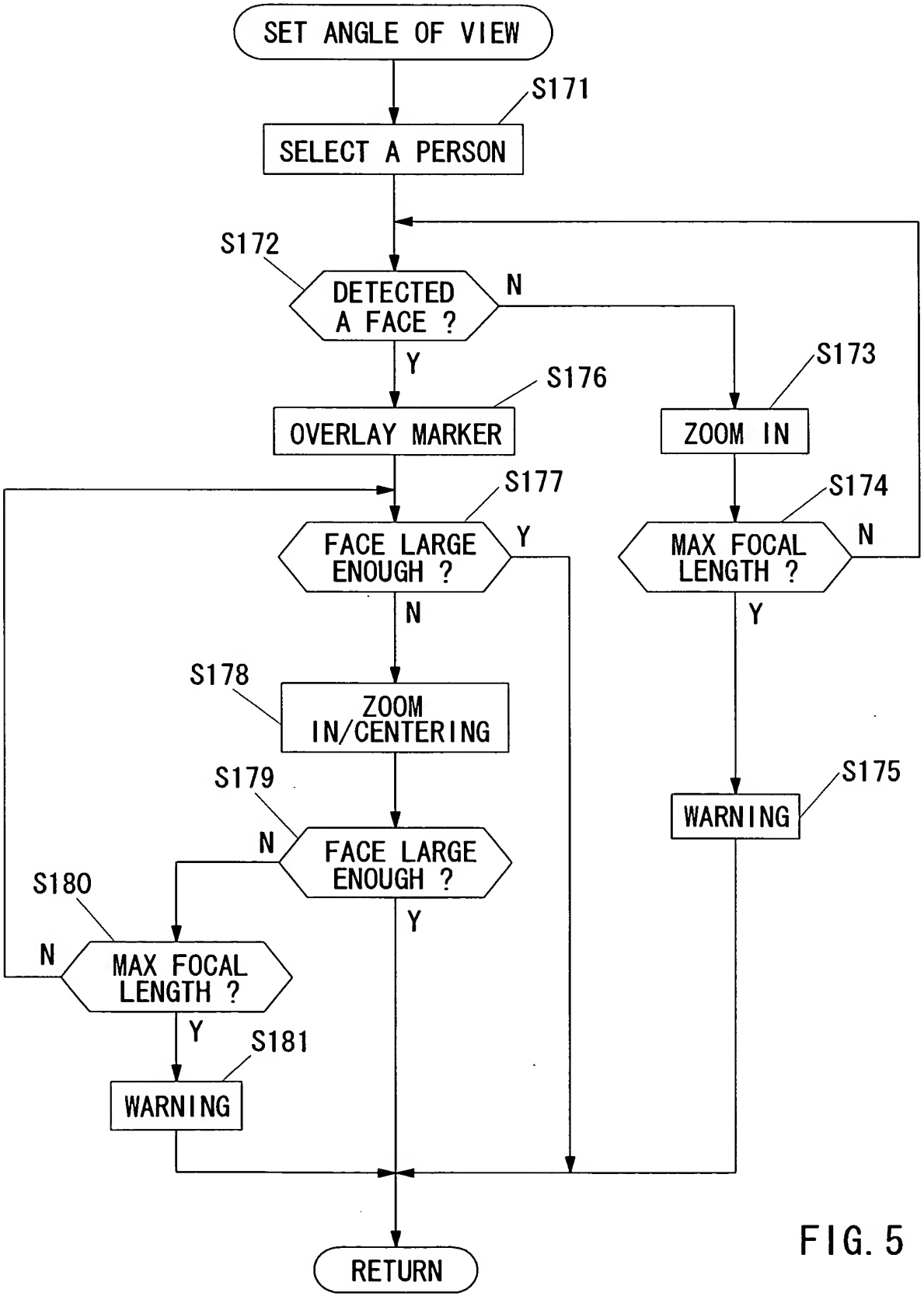
SET ANGLE OF VIEW
S171
SELECT A PERSON
S172
DETECTED A FACE ?
N
Y
S176
OVERLAY MARKER
S173
ZOOM IN
S177
FACE LARGE ENOUGH ?
Y
N
S174
MAX FOCAL LENGTH ?
N
Y
S178
ZOOM IN/CENTERING
S179
FACE LARGE ENOUGH ?
N
Y
S175
WARNING
S180
MAX FOCAL LENGTH ?
N
Y
S181
WARNING
RETURN

FIG. 5

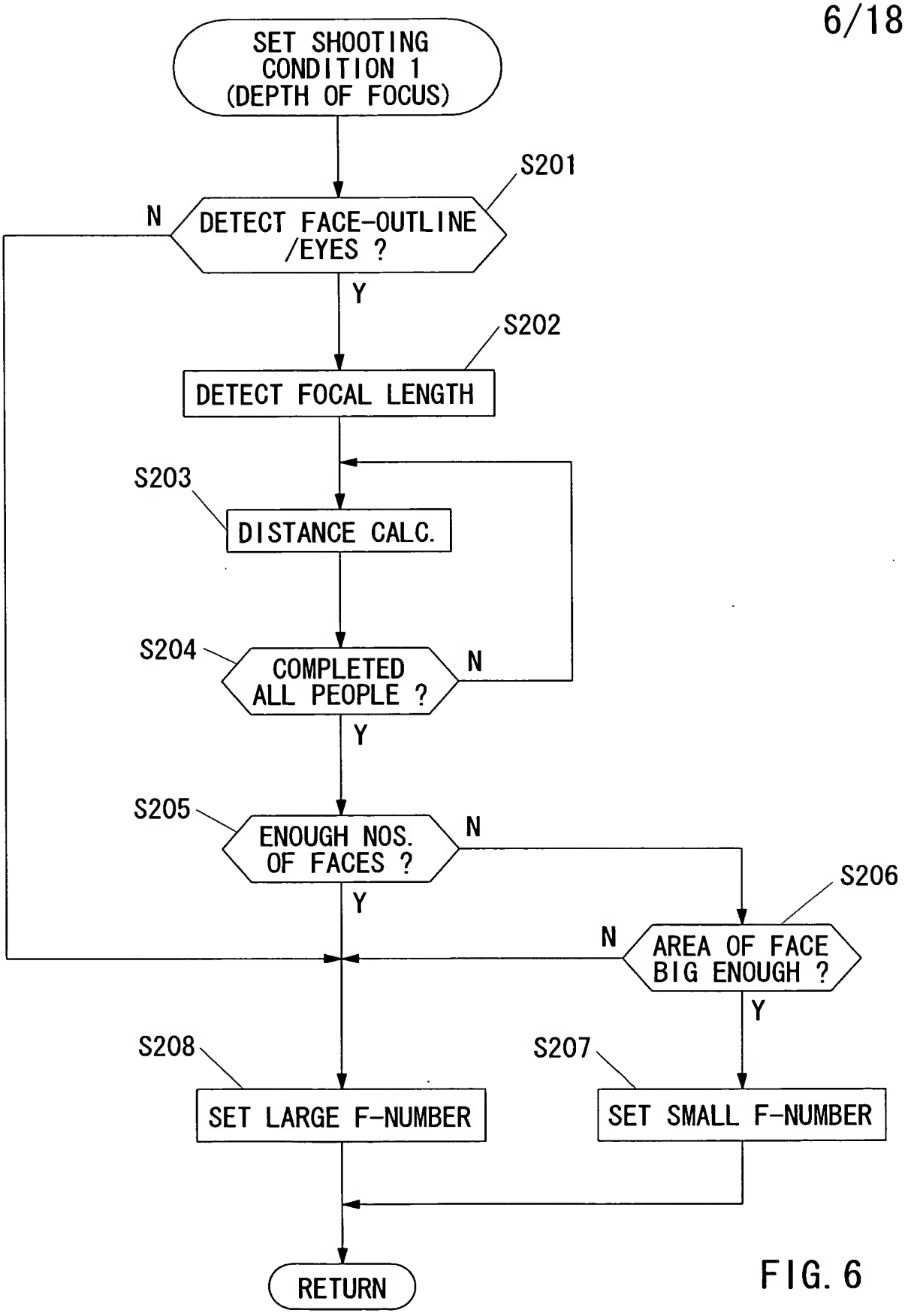
SET SHOOTING CONDITION 1 (DEPTH OF FOCUS)
S201
DETECT FACE-OUTLINE /EYES ?
N
Y
S202
DETECT FOCAL LENGTH
S203
DISTANCE CALC.
S204
COMPLETED ALL PEOPLE ?
N
Y
S205
ENOUGH NOS. OF FACES ?
N
Y
S206
AREA OF FACE BIG ENOUGH ?
N
Y
S208
SET LARGE F-NUMBER
S207
SET SMALL F-NUMBER
RETURN

FIG. 6

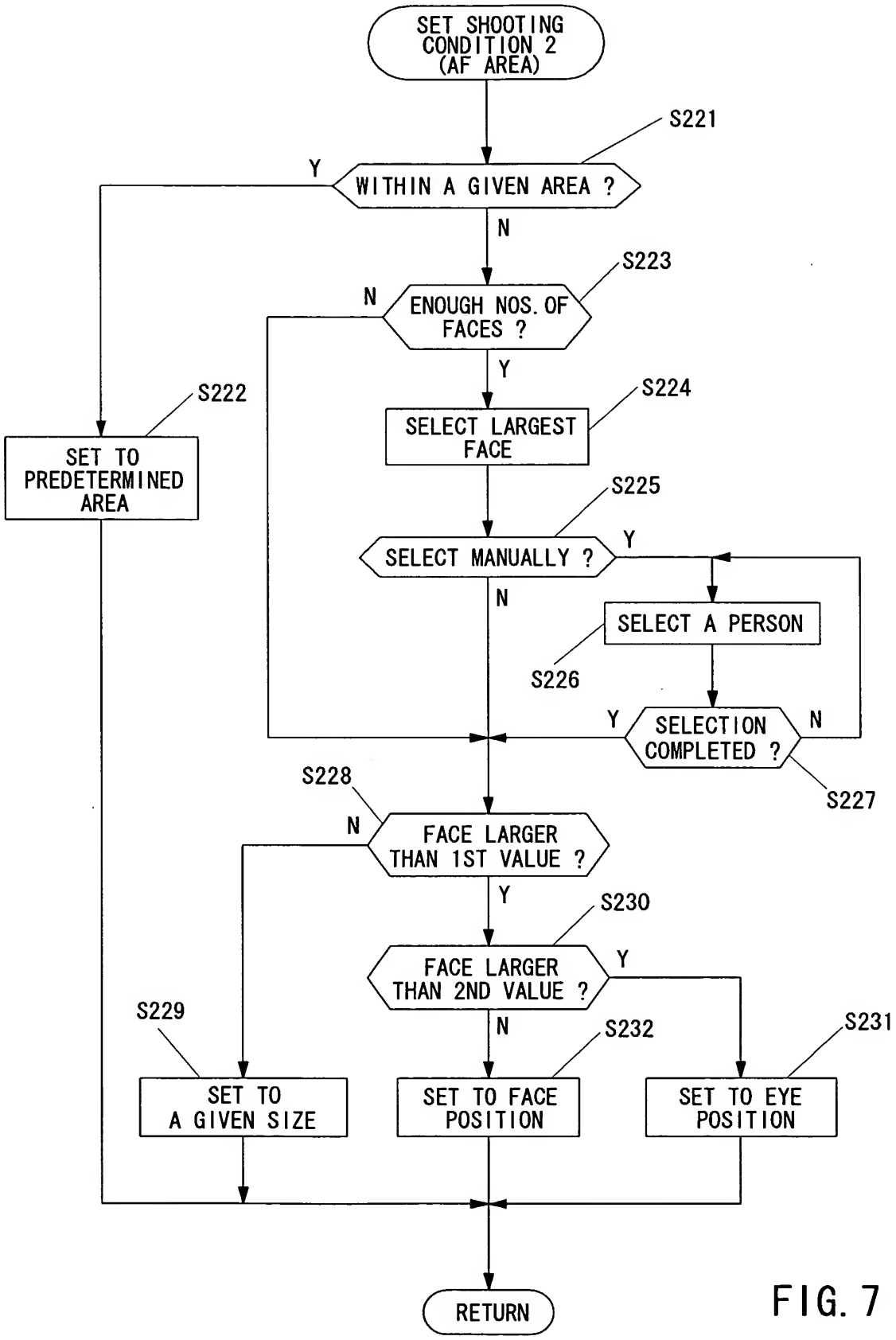
SET SHOOTING CONDITION 2 (AF AREA)
S221
WITHIN A GIVEN AREA ?
Y
N
S223
ENOUGH NOS. OF FACES ?
N
Y
S222
SET TO PREDETERMINED AREA
S224
SELECT LARGEST FACE
S225
SELECT MANUALLY ?
Y
N
SELECT A PERSON
S226
SELECTION COMPLETED ?
Y
N
S227
S228
FACE LARGER THAN 1ST VALUE ?
N
Y
S230
FACE LARGER THAN 2ND VALUE ?
Y
N
S229
SET TO A GIVEN SIZE
S232
SET TO FACE POSITION
S231
SET TO EYE POSITION
RETURN

FIG. 7

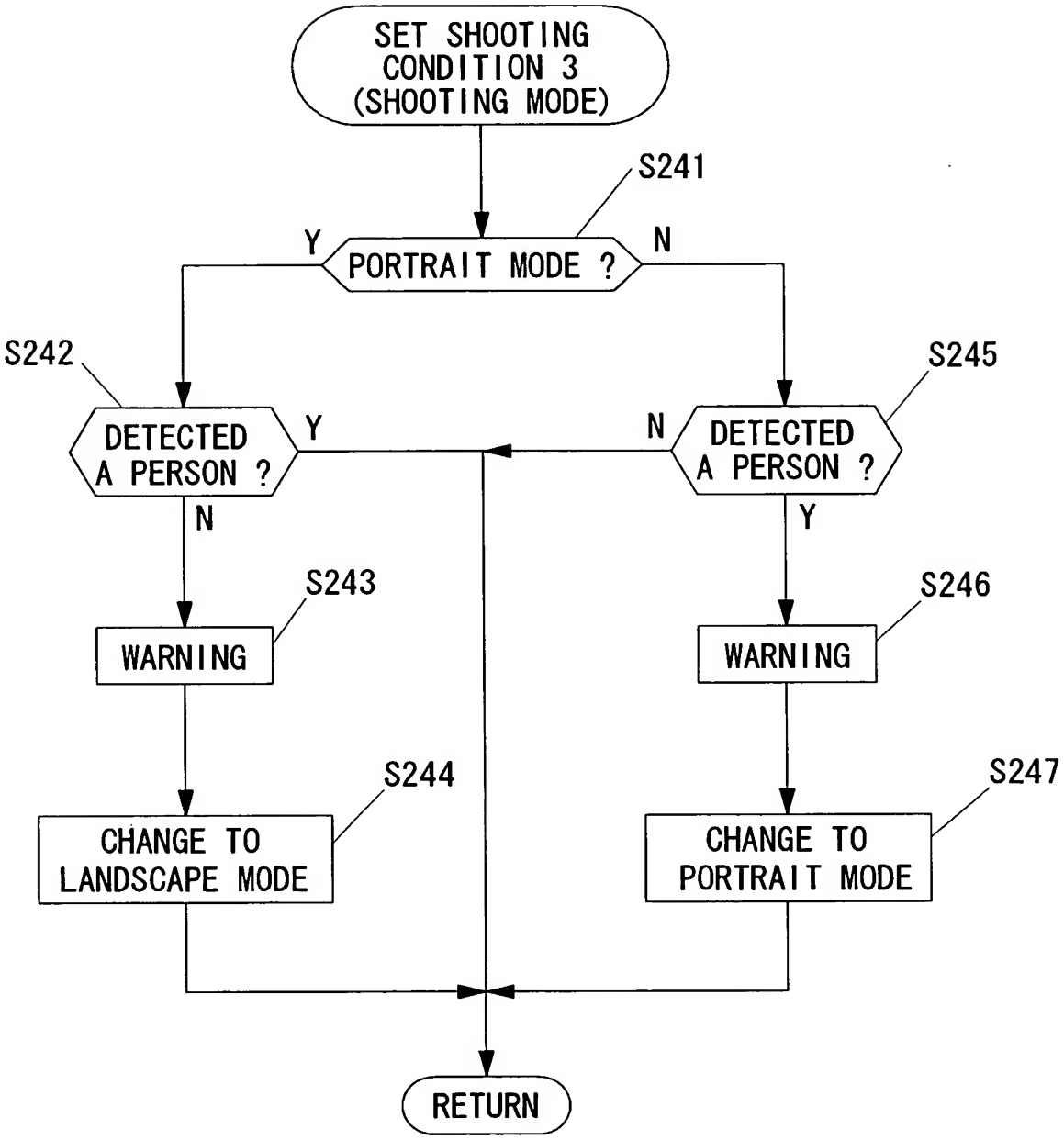
SET SHOOTING CONDITION 3 (SHOOTING MODE)
S241
PORTRAIT MODE ?
Y
N
S242
DETECTED A PERSON ?
Y
N
S245
DETECTED A PERSON ?
N
Y
S243
WARNING
S246
WARNING
S244
CHANGE TO LANDSCAPE MODE
S247
CHANGE TO PORTRAIT MODE
RETURN

FIG. 8

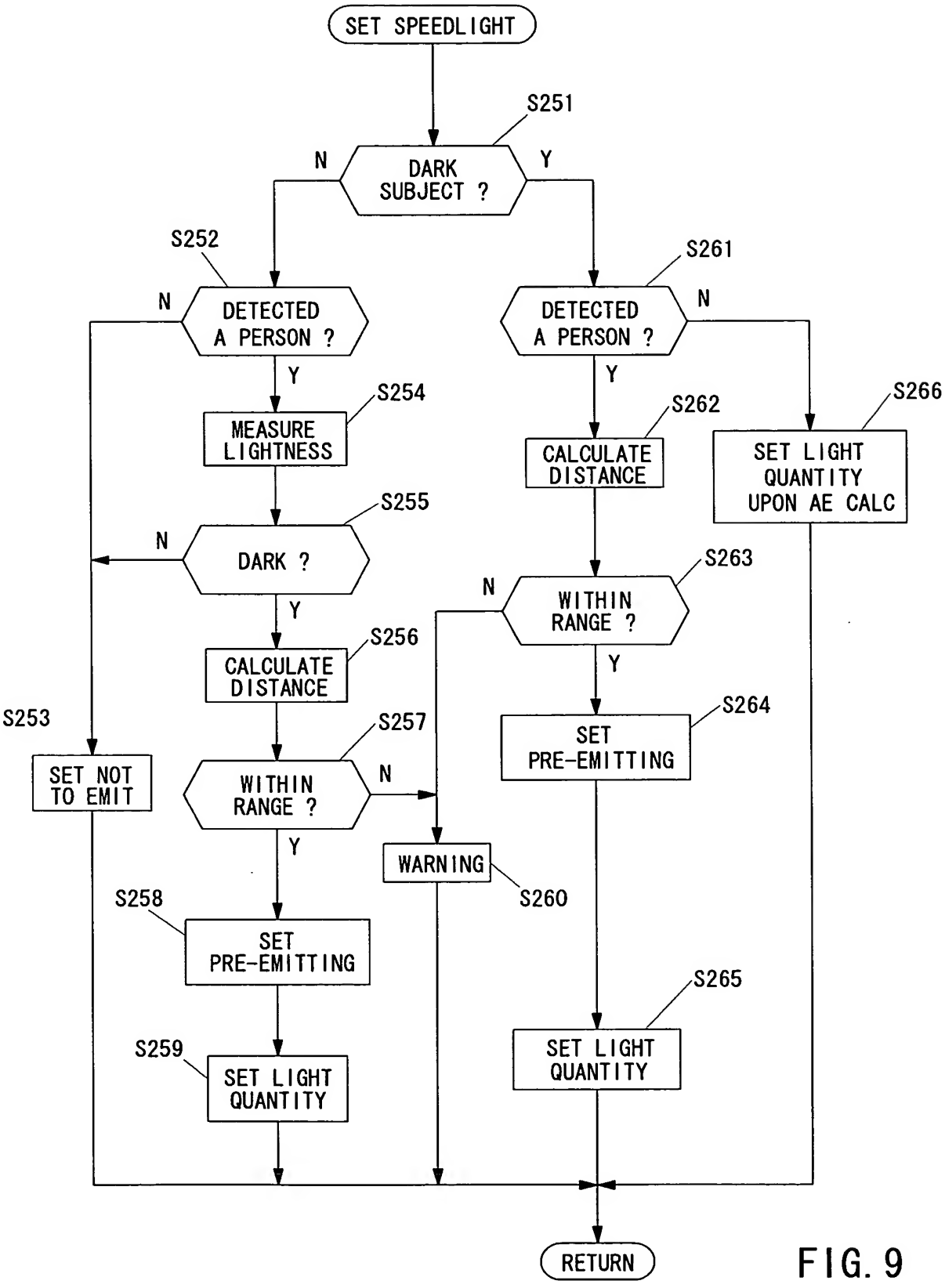
SET SPEEDLIGHT
S251
DARK SUBJECT ?
N
Y
S252
DETECTED A PERSON ?
N
Y
S254
MEASURE LIGHTNESS
S255
DARK ?
N
Y
S256
CALCULATE DISTANCE
S253
SET NOT TO EMIT
S257
WITHIN RANGE ?
N
Y
S258
SET PRE-EMITTING
S259
SET LIGHT QUANTITY
WARNING
S260
S261
DETECTED A PERSON ?
N
Y
S262
CALCULATE DISTANCE
S263
WITHIN RANGE ?
N
Y
S264
SET PRE-EMITTING
S265
SET LIGHT QUANTITY
S266
SET LIGHT QUANTITY UPON AE CALC
RETURN

FIG. 9

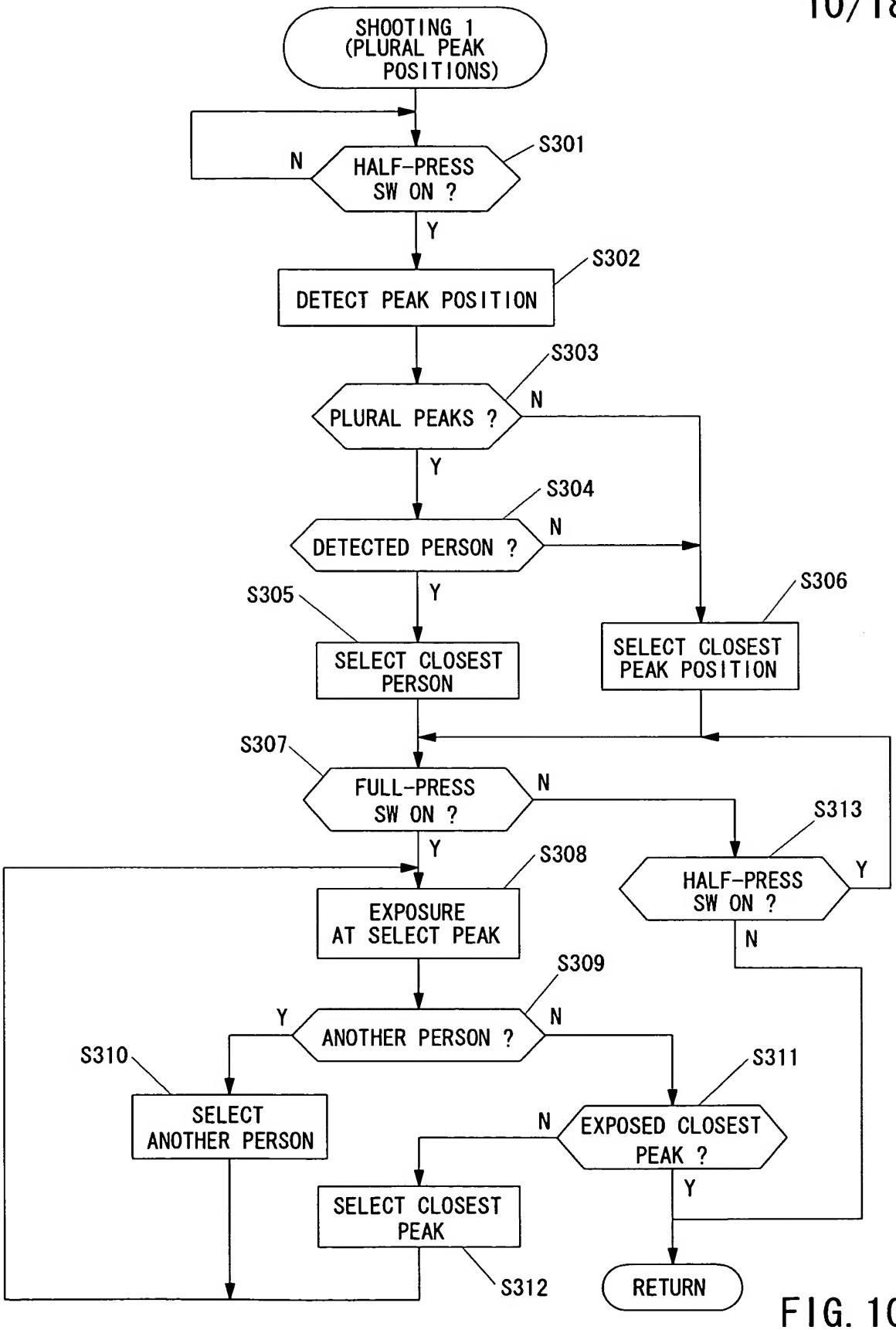
SHOOTING 1 (PLURAL PEAK POSITIONS)
S301
HALF-PRESS SW ON ?
N
Y
S302
DETECT PEAK POSITION
S303
PLURAL PEAKS ?
N
Y
S304
DETECTED PERSON ?
N
Y
S305
SELECT CLOSEST PERSON
S306
SELECT CLOSEST PEAK POSITION
S307
FULL-PRESS SW ON ?
N
Y
S308
EXPOSURE AT SELECT PEAK
S309
ANOTHER PERSON ?
Y
N
S310
SELECT ANOTHER PERSON
S311
EXPOSED CLOSEST PEAK ?
N
Y
SELECT CLOSEST PEAK
S312
S313
HALF-PRESS SW ON ?
Y
N
RETURN

FIG. 10

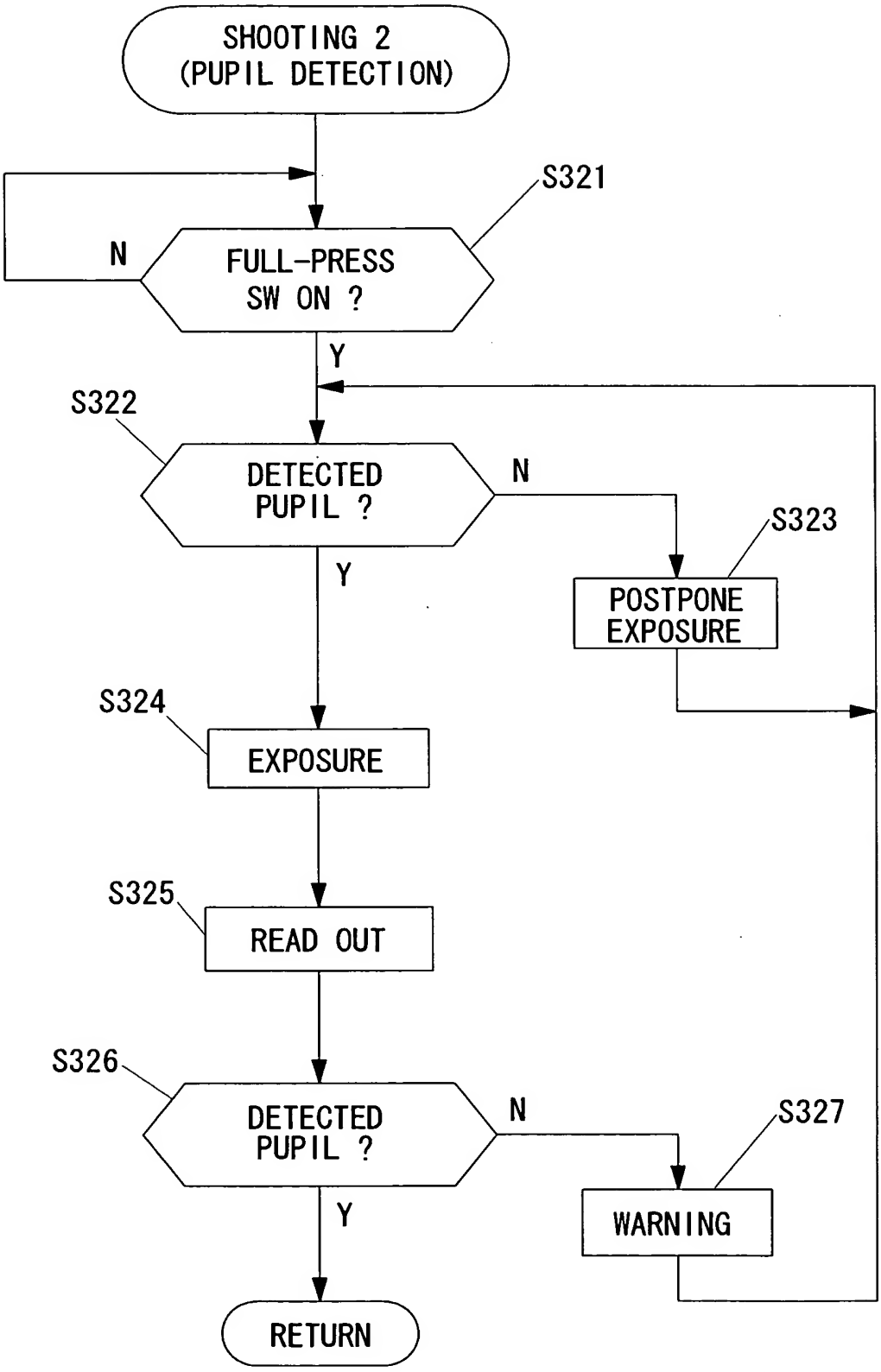
SHOOTING 2
(PUPIL DETECTION)
S321
N
FULL-PRESS
SW ON ?
Y
S322
DETECTED
PUPIL ?
N
S323
POSTPONE
EXPOSURE
Y
S324
EXPOSURE
S325
READ OUT
S326
DETECTED
PUPIL ?
N
S327
WARNING
Y
RETURN

FIG. 11

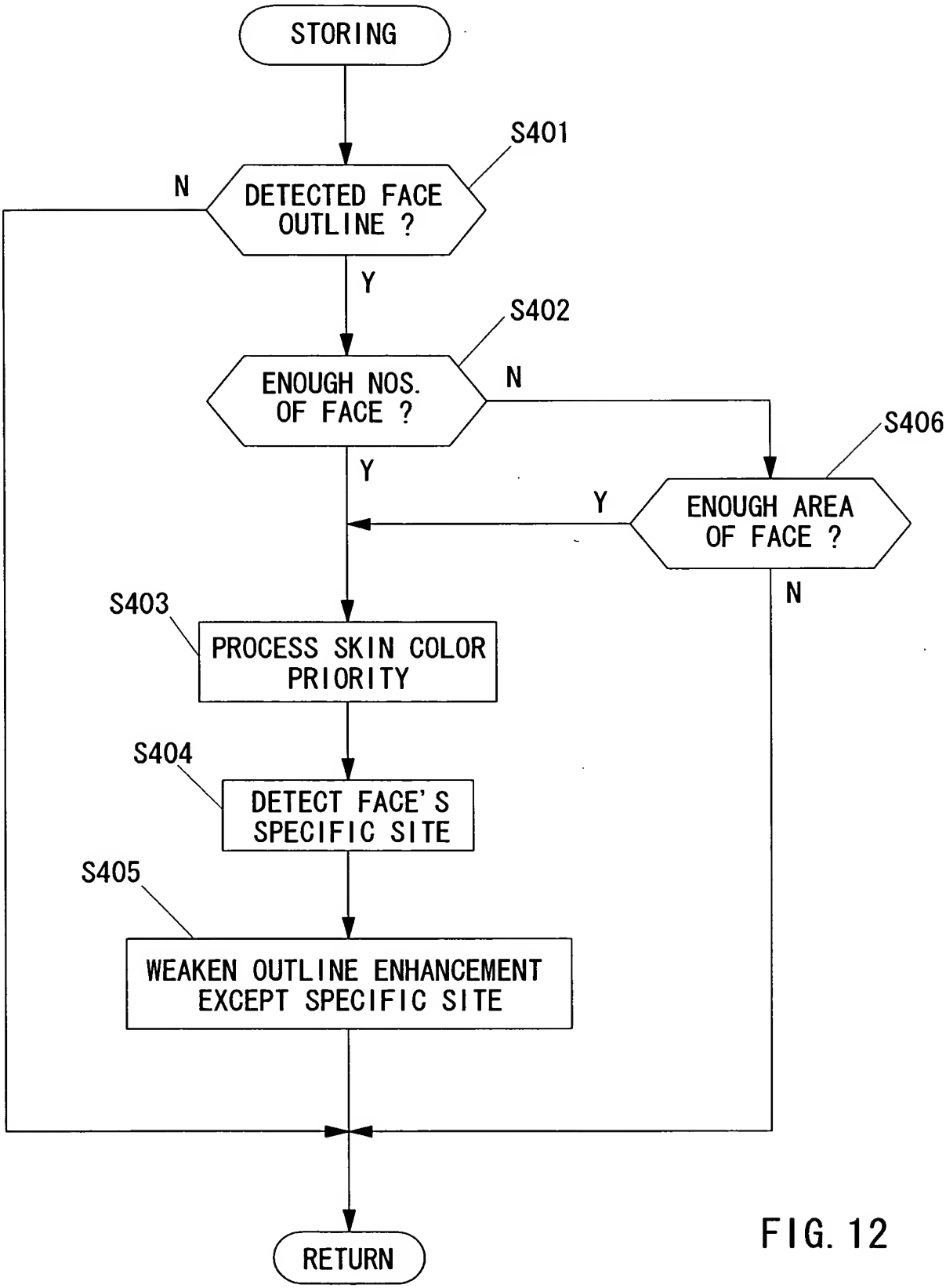
STORING
S401
DETECTED FACE OUTLINE ?
N
Y
S402
ENOUGH NOS. OF FACE ?
N
Y
S406
ENOUGH AREA OF FACE ?
Y
N
S403
PROCESS SKIN COLOR PRIORITY
S404
DETECT FACE'S SPECIFIC SITE
S405
WEAKEN OUTLINE ENHANCEMENT EXCEPT SPECIFIC SITE
RETURN

FIG. 12

FEATURE POINT INFO AREA
・NAME: MR. A ・PRIORITY: 1 ・STORED DATE ・(1) FEB. 10, 2000 ・(2) OCT. 5, 2000 ・(3) JUL. 12, 2001
・NAME: MS. B ・PRIORITY: 3 ・STORED DATE ・(1) JAN. 10, 2002
・NAME: MS. C ・PRIORITY: 2 ・STORED DATE ・(1) FEB. 10, 2000
・NAME: MR. UNKNOWN 1 ・PRIORITY: N/A ・STORED DATE ・(1) JAN. 26, 2002
・ ・ ・

FEATURE POINT DATA AREA
A(1)
A(2)
A(3)
B(1)
C(1)
N/A1(1)
・ ・ ・

FIG. 13

FILE NAME DSC002

FEATURE POINT INFO AREA

- NAME: MR. A
- PRIORITY: 1
- DETECTED DATE: FEB. 10, 2000
- DETECTED POSITION: (x, y)=(123, 456)
- ADDED DATE: (2) OCT. 5, 2000
  (3) JUL. 12, 2001

- NAME: MS. C
- PRIORITY: 2
- DETECTED DATE: FEB. 10, 2000
- DETECTED POSITION: (x, y)=(987, 654)

FEATURE POINT DATA AREA

A(1)

A(2)

A(3)

C(1)

IMAGE DATA AREA

FIG. 14

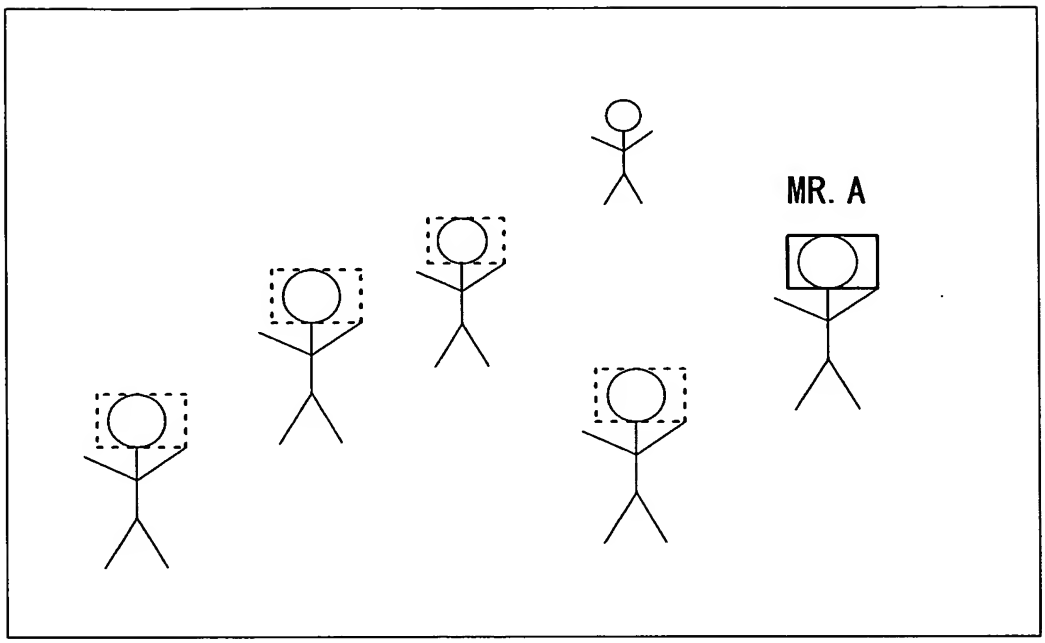

FIG. 15

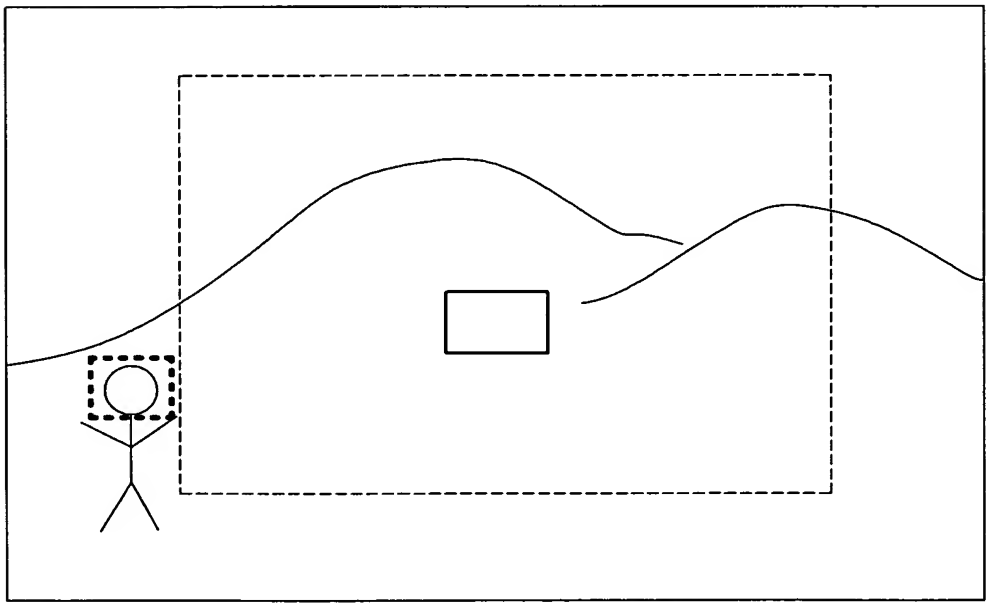

FIG. 16

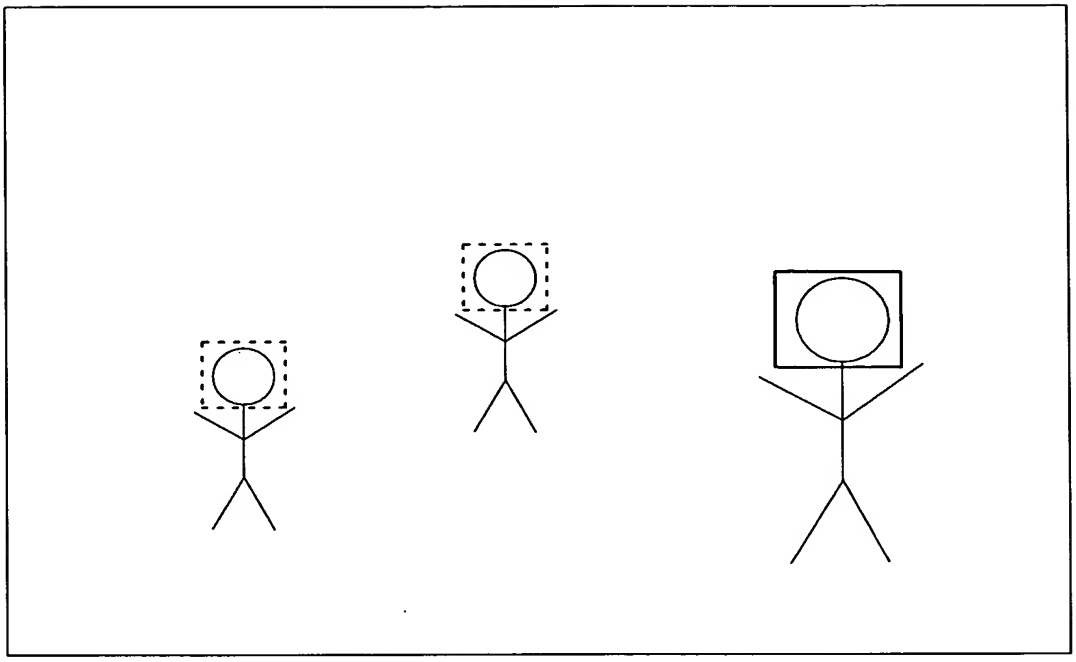

FIG. 17

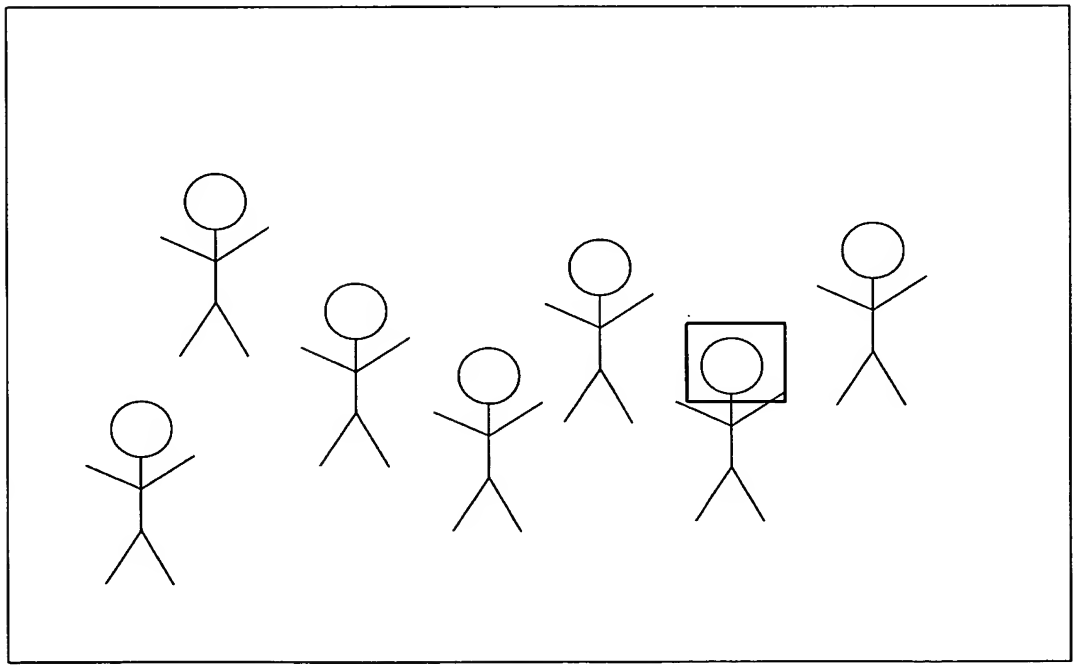

FIG. 18

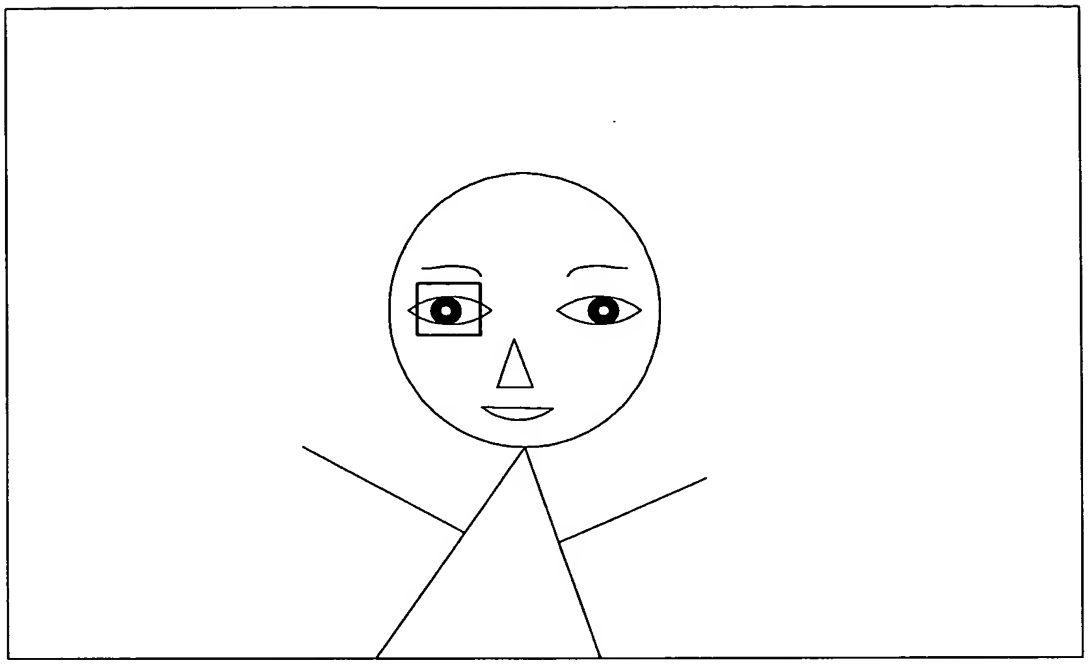

FIG. 19

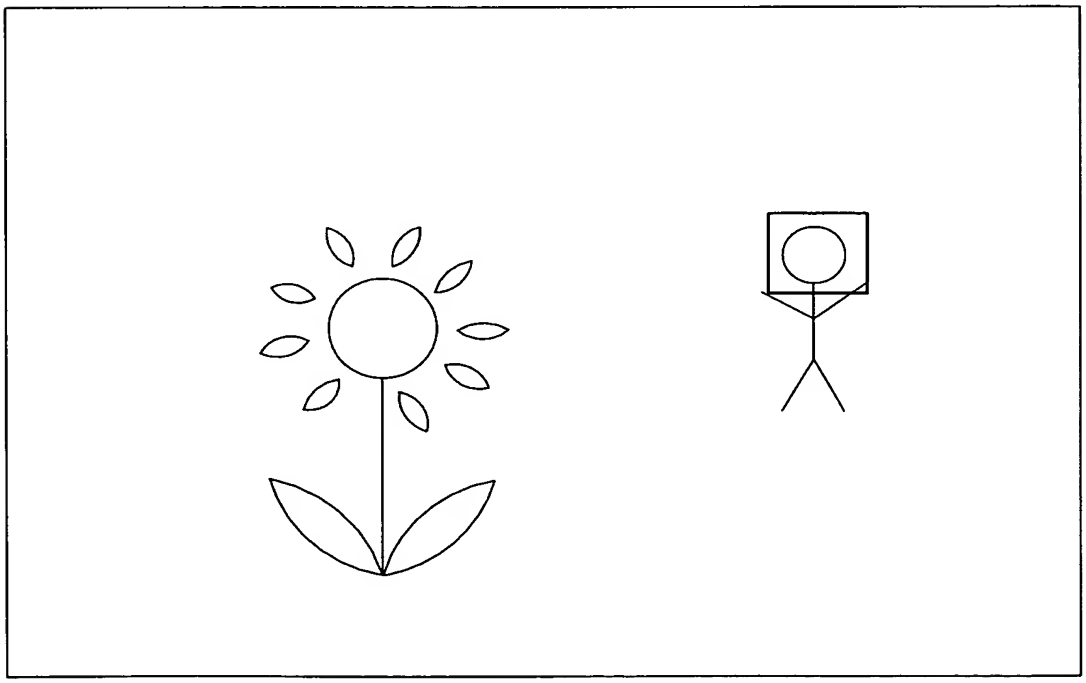

FIG. 20

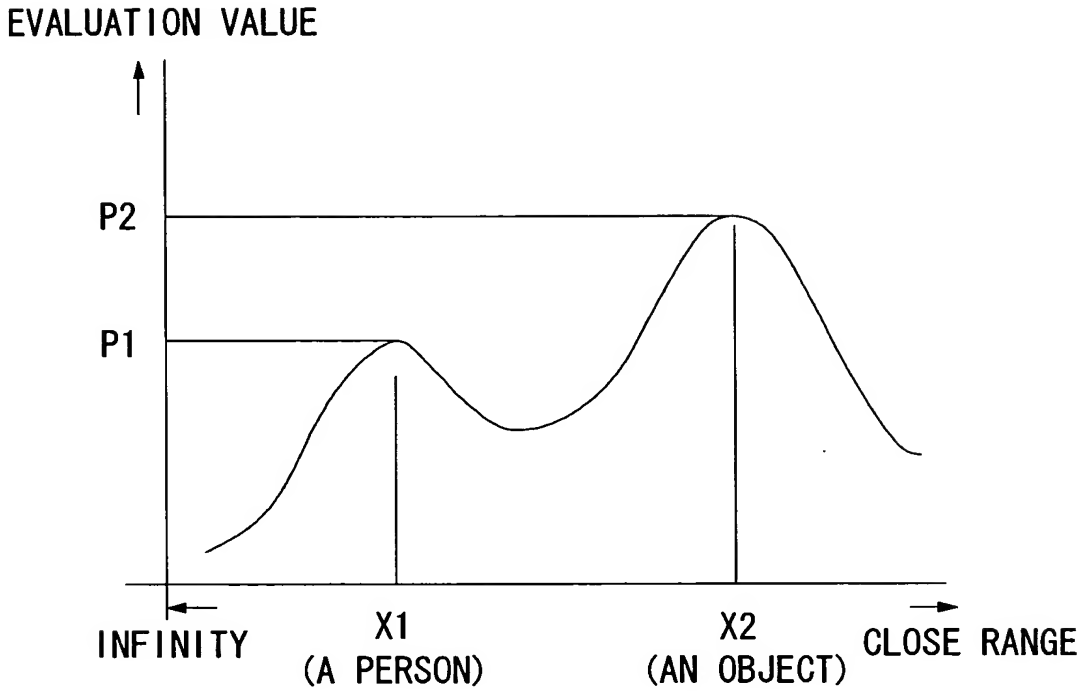
EVALUATION VALUE
P2
P1
INFINITY
X1
(A PERSON)
X2
(AN OBJECT)
CLOSE RANGE

FIG. 21

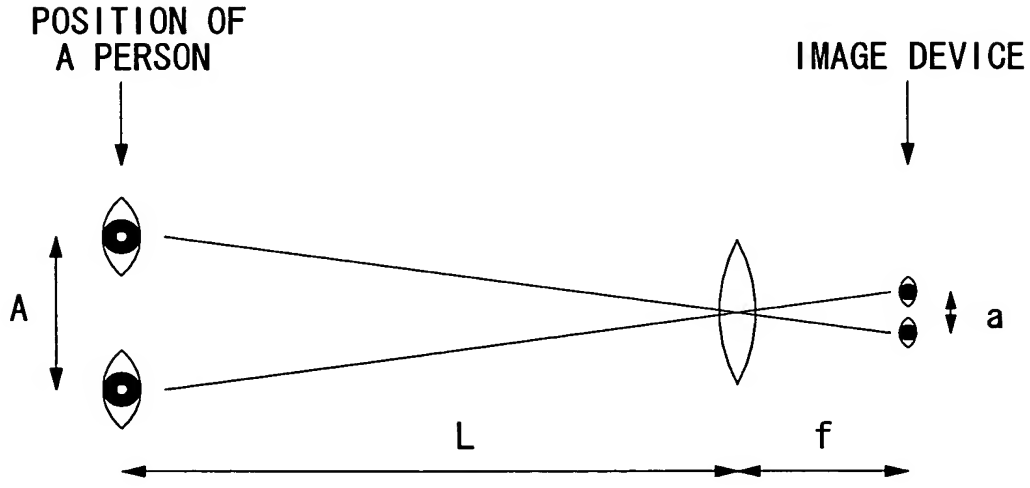
POSITION OF
A PERSON
IMAGE DEVICE
A
a
L
f

FIG. 22